THE EUROPEAN PINE SHOOT MOTH IN THE WEST [1/]

By

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Foresters of the western United States are concerned about the European pine shoot moth (Rhyacionia buoliana (Schiff.)), a newcomer to the area. That is, many foresters are concerned about it. Owners and managers of pine forest lands are the ones most concerned.

In the western states, the shoot moth was discovered in the spring of 1959 on ornamental pine in Bellevue, Wash., a suburb of Seattle. In British Columbia it has been known since 1925. Since 1959 it has been found on ornamentals extensively in the Puget Sound area and locally in Spokane, Wash., and in Portland, Salem, and Eugene, Ore. In April 1962 it was found to have spread to native lodgepole pine at Shelton in western Washington. It threatens to spread to native ponderosa pine, a highly susceptible timber-producing tree of great economic importance. Foresters fear that, once established on ponderosa pine, the shoot moth would make the growing of that tree difficult and costly.

Why do they fear this?

They have weighed what has occurred elsewhere with what seems likely to occur in their forests. They have found that on some forest areas in eastern states, the shoot moth makes it impractical to plant and grow red pine, one of its preferred hosts. Other tree species must be substituted. Tests with ponderosa pine planted in the Lake States showed it to be as susceptible as red pine. In many parts of the West, only ponderosa pine can be grown commercially. There is no practical option of growing some other species.

On extensive areas in the East the shoot moth deforms and retards tree growth making chemical control necessary. Chemical control is expensive and must be repeated for a considerable time, either that, or accept the damage. Pruning to correct forking caused by the shoot moth also is expensive.

1/ An invitational paper given at the 46th annual meeting of the Pacific Branch, Entomological Society of America, in San Mateo, Calif. June 26-28, 1962.

The shoot moth is especially damaging to slow growing trees. Much of the ponderosa pine in the West is slow growing, hence likely to suffer heavy attack. Being slow growing and requiring more than a century to mature a crop, ponderosa pine cannot afford extra costs of chemical protection. Neither can it afford any material lengthening of time to mature that might be caused by repeated attacks of the shoot moth.

In the eastern states, in eastern Canada, and in Europe, the shoot moth thrives under widely diverse climatic conditions. On areas where very low temperatures occur, it suffers heavy winter mortality, but even there it may persist under snow cover. At Spokane, Wash., in the ponderosa pine region, the shoot moth already has overwintered three or four years and multiplied. Minimum temperatures in much of the ponderosa pine region are favorable for the shoot moth.

Parasites, both imported and native, have been relatively ineffective in controlling the shoot moth in the East. There is no evidence that they would be more effective in the West.

From these facts and considerations, western foresters have concluded that the hazard created by the shoot moth is high and that prompt and strenuous action should be taken to keep it out of commercial pine forests.

Growers of ornamental pine trees view the shoot moth differently. To them, it is an insect that can be kept within reasonable limits under ornamental conditions by spraying and clipping. To them it is a control problem and, to them, the costs of control on their properties do not seem excessive. To a degree they like the twisted and dwarfed appearance that the shoot moth imparts to attacked trees. They are surprised at the forester's concern about the shoot moth and are surprised at being involved in efforts to eradicate it. They recognize the importance of the lumber industry to the economy of the West, and generally are cooperative in the efforts being made to keep the shoot moth out of the forests. However, in two communities in western Washington they have stalled efforts to eradicate the shoot moth locally by destruction of infested trees.

Discovery of the shoot moth in Seattle was by accident. An alert gardener found it on his ornamental trees and reported it to the Foreign Plant Quarantine Division of the U. S. Department of Agriculture. It was identified by the insect identification unit of the Department in Washington, D. C. Several months after the discovery, foresters learned of it. A growing season passed and the shoot moth spread. Valuable time was lost.

This illustrates a gap in surveys to detect forest insects. State nursery inspection service is primarily to serve and protect the nursery industry and agricultural interests. Nursery inspectors are sympathetic and cooperative regarding forest pest problems, but forest pest problems are secondary to them. The Forest Service regularly conducts insect surveys on federal forest lands and cooperates with state and private organizations in surveying other classes of forest lands. State foresters are primarily responsible in most states for making insect surveys on state municipal, and private forest lands, but their responsibility usually does not extend to ornamental nurseries and plantings. Even after discovery of the shoot moth in Oregon, it was necessary for the state forester to obtain legislation to permit his staff to survey for the shoot moth on non-forest land. This authority met a specific need, but in general there still is a gap in survey responsibility that needs to be closed.

In 1960, through the efforts of the Northwest Forest Pest Action Council, a comprehensive survey of nurseries and ornamental plantings in Washington and Oregon was made by many individuals and organizations. Garden club members, notably in the Seattle area, played an important part in this survey. It revealed that the shoot moth was well established in and around Seattle, where it seemed to have been introduced several years previously from Canada; that the moth was present in Spokane, Wash., where ponderosa pine grows naturally; and that elsewhere the moth did not seem to be established. This cooperative survey was helpful in showing the general picture. It also revealed that a more detailed survey by specially trained crews would be needed for a precise evaluation of the situation. Such a survey was made in 1961 by forestry and agriculture organizations of the two states and of the federal government. A similar survey is currently in progress.

The survey in 1961 largely substantiated the findings of the preceding year. Some additional infestations were found, notably in Portland, Salem, and Eugene, Ore., where eradication was undertaken. Additional infestations were found in western Washington, but none in the ponderosa pine region of either state, other than the one in Spokane where eradication also was undertaken. Over all, fifteen species and varieties of pine were recorded as infested. None was found immune to attack, although the white pines were attacked only lightly.

The 1962 survey revealed no infestation in Spokane, Wash., not in Oregon, except for three properties in Portland where the trees were promptly destroyed. Elsewhere the situation remained little changed except for the escape onto native lodgepole pine at Shelton, Wash.

Surveys for the shoot moth have been made in several other western states, all negative according to reports. Certainly this is encouraging, taking into account the many years that pines have been shipped into the West unrestricted.

When the findings of the cooperative survey of 1960 in Washington and Oregon were in, the Northwest Forest Pest Action Council spearheaded an effort to keep the shoot moth out of the commercial pine forests of the West. Quarantine, containment, and eradication were decided upon as the essential steps to be taken. Northwestern foresters were unversed in all three of these activities, but they learned about them, and they continue to learn.

After considerable unproductive effort to obtain a federal interstate quarantine, a foreign quarantine was imposed and several states invoked quarantines prohibiting entry of pines from recorded areas of infestation. To date seven of the eleven states of the western pine region have adopted uniform quarantines against the shoot moth. Some states where the shoot moth is not considered of potential importance, but where it might survive and spread to adjoining states, have no quarantine against it. Some states were prompt to act, but in general quarantine action has been slow.

In their efforts to obtain quarantines, foresters soon found that they were dealing with plant boards, western and national. They found that they had neglected to keep the boards informed of their interest in and dependence upon quarantines for restricting the movement of introduced forest insect pests. Belatedly they found that they were coming as petitioners and presenting their case to courts essentially unversed in forestry. Foresters were not directly represented on the bench. Perhaps it is not surprising that the national board considered the shoot moth unimportant, hence that efforts to eradicate it were unimportant. This was an opinion. Foresters felt differently. Also, as expressed by the Northwest Forest Pest Action Council and by the Western Forest Pest Committee of the Western Forestry and Conservation Association, they felt that more careful and prompt attention should be given to their quarantine needs, increasing needs in these days of rapid transportation. Now, as a result of Resolution 5 of the Western Plant Board in 1961 and an awakened interest by foresters; a closer working relationship is being developed.

In western Washington, the effort against the shoot moth is restricted to containing it within present limits through intrastate quarantine of nursery stock and by eradicating outlying spots of infestation south of township 18 North. This, imposes restrictions on the nurserymen in that they must either refrain from shipping outside the containment zone or must fumigate and ship their pine stock at a prescribed time. The regulatory details have not yet been fully worked out. Until they are, the threat of spread is great.

The single most important situation is in Spokane. Failure to eradicate the shoot moth from that city would insure its establishment and spread in the ponderosa pine region. Eradication in Oregon also is important because that state grows and distributes large quantities of ornamental pine. Eradication from Spokane and from Oregon is progressing well. Nurseries in those places apparently are clean and no present infestation on outplanted ornamentals is known.

Until recently, destruction of infested trees was the only eradication measure available. Now methyl bromide fumigation has been developed and recommended as an alternative. 2/ Equipment and procedures have been developed for fumigating lifted trees and trees growing in ornamental plantings and nurseries. When recommendations are carefully followed, most species of pine can be fumigated and cleaned of the shoot moth with minimum damage to the tree. Some species of pine, such as lodgepole and Japanese black, are especially subject to damage by methyl bromide, hence must be treated with special care. Late fall, winter and early spring are the safest times to fumigate. On an eradication project, fumigation would be more expensive than destruction, but would have the advantage of saving the treated trees. At present, few if any commercial operators are equipped for field fumigation according to recommendations.

Detection of the shoot moth is very difficult during much of its life. The difficulty increases when the insect populations is small and the amount of host material to be examined is large. Certification that any large quantity of nursery stock is free of infestation on the basis of inspection alone is unrealistic. A clean source, or fumigation with methyl bromide are the only known ways of insuring clean pine stock. Probably the best way in uninfested areas is to grow pines from seeds. The growing of forest planting stock in ornamental nurseries increases the risk of spreading the shoot moth. Pine stock grown in forest nurseries in infested areas should be fumigated before moving to the forest.

The difficulty of detection adds to the usual difficulties of eradication. A buffer zone around each recorded spot of infestation in which all pines are fumigated or destroyed, is needed to increase the chances of success. An empirical decision must be made in defining such a zone because the potential maximum dispersal in a single year seems to be several miles. Evidence in the Pacific Northwest is that a spread of 1/4-mile or more annually is quite likely in residential areas when populations become heavy.

At present the shoot moth battle is a holding operation - to gain time until some new and feasible method of complete eradication from the West is developed, or at least to postpone the day when the costs of recurring direct control will have to be saddled upon the ponderosa pine forests. To be successful in this holding effort, foresters must have the continued cooperation of nurserymen and agriculture officials who are only indirectly concerned with the protection of forest resources. Efforts must be western wide, wherever the shoot moth can live, and regardless of its potential local importance.

2/ Carolin, V. M., W. H. Klein, and R. M. Thompson, 1962. Eradicating European Pine Shoot Moth on Ornamental Pines with Methyl Bromide. Research Paper No.47. Pacific Northwest Forest and Range Experiment Station, Forest Service, Portland, Ore.

Research is needed and is in progress. Refinements in the fumigation process are being developed. The shoot moth and its natural control in its new environment are being studied to get an idea of how the moth might act if it were to escape to commercial forests lands. Foreign parasites likely will be imported soon. In the Northwest and elsewhere tests with insecticides are being continued. In the eastern states the economic impact of the shoot moth is being studied. Perhaps we will soon be able to place an exact dollar value on the threat. The fruit of research that is needed most is some magic way to get rid of the shoot moth, even though it is widely established in the Douglas-fir region, so that containment need not be endlessly prolonged. No such magic key is yet in sight.

Experience with the shoot moth indicates that protection against the invasion of foreign forest insects, including those that have gained a foothold in other parts of this country, needs to be strengthened. The movement of forest trees species, for whatever purpose, needs to be more carefully regulated to guard against the spread of destructive insect pests. Quarantine procedures need to be reviewed and strengthened to insure that forest crops are given protection commensurate with their importance.